AP250 Automated Projector

User's Guide

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Introduction

Congratulations on your purchase of the AP250 Automated Projector.

In the field of subjective refraction, the AP250 is used for measuring visual acuity.

This User's Guide is designed as a training and reference manual. We recommend you carefully read and follow the steps in this guide to ensure optimum performance from your new instrument.

Please retain this guide for future reference and to share with other users.

For additional copies or assistance with this product, contact:

- An authorized Reichert Ophthalmic Instruments dealer,

  or our
- Customer Service Department by telephone at (716) 686-4500, by fax at (716) 686-4555, or by e-mail at info@reichert.com.

Package Contents

Your new AP250 Automated Projector and accessories were carefully packed and checked prior to shipment; however, please check condition and contents upon delivery. In addition to your AP250, this shipment should include:

1 Projection Screen
1 Spare Halogen Bulb
1 Power Cord
1 Dust Cover
1 Remote Control
2 Hexagon Keys (3mm and 5mm)
2 Fuses 250ma (230V)
2 Fuses 500ma (110V)
1 Table Base
1 Pair of red/green polarizing spectacles
4 AAA-sized batteries

Safety Precautions

- Except for changing the Halogen bulb and replacing the fuses, any repair or service on the AP250 must be performed only by authorized Reichert Ophthalmic Instruments personnel.
- Only qualified and trained personnel should operate the AP250.
- Training for operating personnel is the sole responsibility of the owner.
- Plug the AP250 only into a grounded electrical receptacle. Do not remove or obstruct the grounded electrical connection or damage to the instrument or injury to the operator may occur.
- The line voltage setting on the instrument should agree with the local line voltage. Otherwise, damage to the instrument or injury to the operator may occur.
- Always use the power switch when turning the unit off. Turn the instrument off when not in use.
- Do not cover any ventilation slots.
- Do not use the AP250 in the presence of flammable anesthetics and volatile solvents such as alcohol, benzine or similar agents.
- Do not set up the instrument in humid conditions. Avoid dripping or splashing water near the instrument.
- Use only accessories specified in this manual. If you intend to use other accessories, consult an authorized Reichert Ophthalmic Instruments dealer or our Customer Service Department.
- Never look into the AP250's light source.
- Disconnect the power cable prior to replacing the AP250's Halogen bulb. Allow the lamp to cool down a sufficient amount of time or injury (burning) may occur.

Symbol Information

The following symbols appear on the instrument:

CAUTION - Indicates that important operating and maintenance instructions are included in this User's Guide.

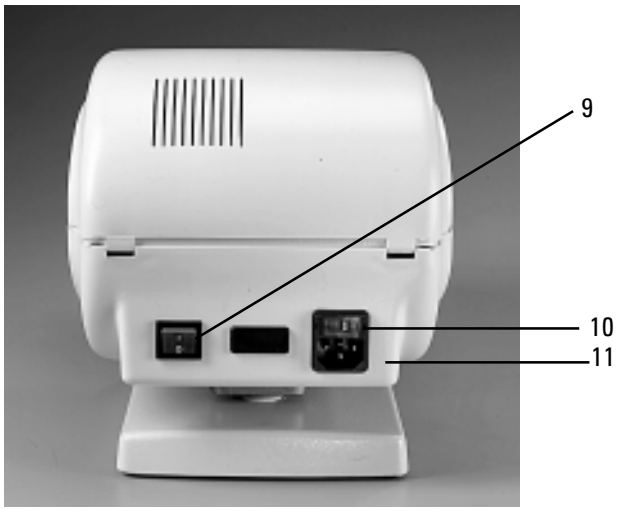
Type B Product Classification
Class 1 Equipment, Continuous Operation

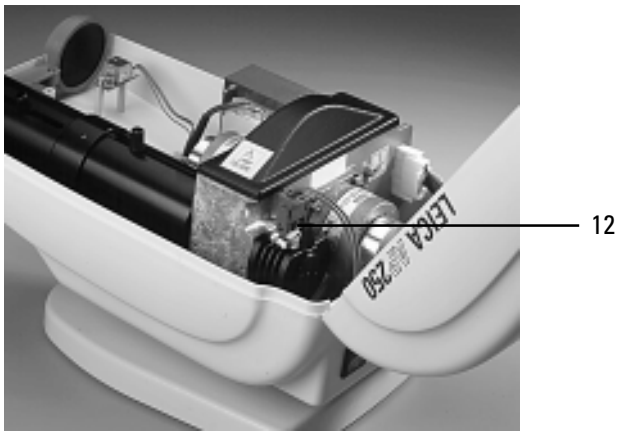
Protective Earth

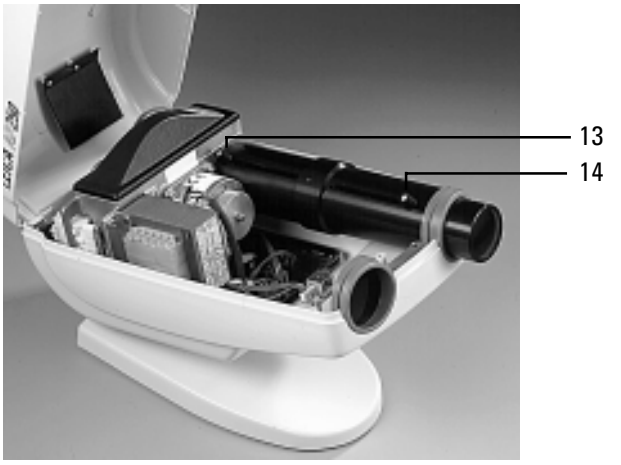
Dangerous Voltage

Instrument Components

1. Projector Head
2. Projection Lens
3. Window for Remote Detection
4. Base
5. Remote Control Unit
6. Hexagon Screw
7. Hinge for Tilting Projector
8. Mounting Screw
9. Power Switch
10. Fuse Compartment with Voltage Indicator
11. Power Connector
12. Halogen Bulb Assembly
13. Chart Focusing Control
14. Distance Focusing Control







Installation

The AP250 should be installed according to the following procedures:

1. If using a wall mount, it is best to locate a wall stud to support the projector's weight.
2. The following distances are important in the set-up of a refracting room:

   REFRACTING DISTANCE (RD) The distance from the patient's eye to the screen.

   PROJECTION DISTANCE (PD) The distance from the slide to the screen.

   LETTER HEIGHT (LH) The height of a 20/200 character should be equal to the refracting distance times the tangent of 50 minutes of arc or .014545.

   LH (inches) or (mm) = RD (inches) or (mm) x .014545

   For example, a refracting distance of 240 inches (20 feet) will require a 20/200 height of 3.49 inches (240 inches x .014545 = 3.49 inches) or for a 4000 mm (4 m) refracting distance, you will require a letter height of 58.18 mm (4000 mm x .014545 = 58.18 mm).
3. Determine the refracting distance by measuring the distance from the patient to the screen. Please refer to Figures 1 and 2, below, which show combinations of refracting and projection distances achievable with this system.
4. Install the projector screen.
6. If attaching the AP250 to a mount, loosen the mounting screw (see "Instrument Components," p. 3, #8) and insert the projector mount onto the ball. Tighten screw, allowing for some movement of the projector for final positioning. Fully tighten the screw after final adjustment and alignment of the system.

   NOTE: There should be a distance > 5 ft. (1.5 m) between remote control and the projector. Make sure no objects that could interrupt remote control signals are located between remote control and projector.
7. Make sure that voltage indicator number corresponds with the available local mains.
8. Plug power cord into AC inlet and into a wall power outlet. Set the power switch to the "ON" position.

PROJECTION RANGE LIST		
Projection Distance	**Minimum Refracting Distance**	**Maximum Refracting Distance**
FT M	**FT M**	**FT M**
10 3.0	7.4 2.3	11.6 3.5
11 3.3	8.2 2.5	12.7 3.9
12 3.6	8.9 2.7	13.0 4.2
13 3.9	9.6 2.9	15.0 4.6
14 4.2	10.4 3.2	16.2 4.9
15 4.5	11.1 3.4	17.3 5.3
16 4.8	11.8 3.6	18.5 5.6
17 5.1	12.6 3.8	19.6 6.0
18 5.4	13.3 4.1	20.8 6.3
19 5.7	14.0 4.3	21.9 6.7
20 6.0	14.8 4.5	23.1 7.0
21 6.4	15.5 4.7	24.3 7.4
22 6.7	16.2 4.9	25.4 7.7
23 7.0	17.0 5.2	26.6 8.1
24 7.3	17.7 5.4	27.7 8.4
25 7.6	18.4 5.6	28.9 8.8
26 7.9	19.2 5.8	30.0 9.2

Figure 1 - Projection Range List in meters and feet.

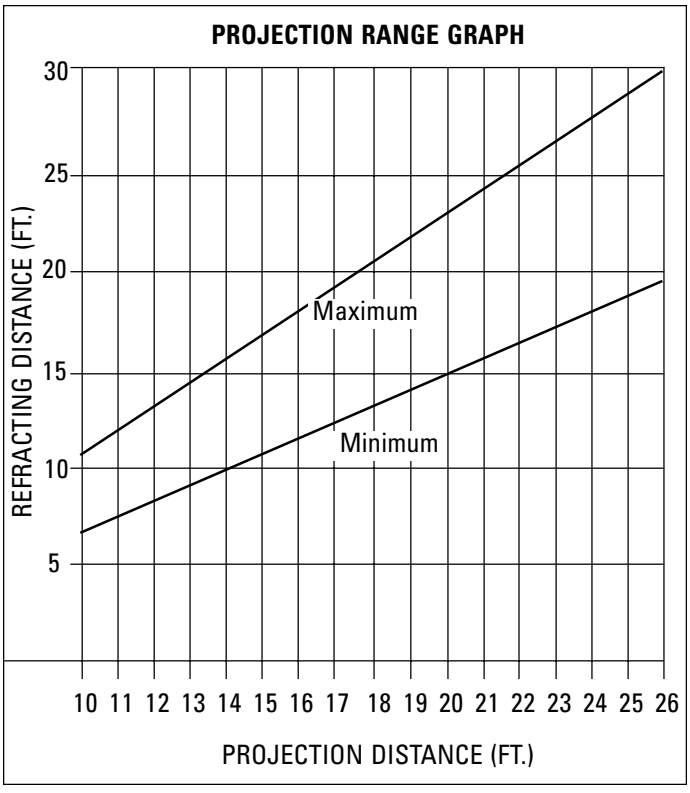


Figure 2 - Projection Range Graph in feet.

Alignment

You can choose an optimum projection distance when patient and projector are equally away from the projection screen.

Images can be optimally focused at projection distances between 10 ft. (3 m) and 26.5 ft. (8 m).

1. Project a 20/200 or 0.1 **"Z"** (or other characters) onto the screen by pressing the Z V F / P N D key.
2. Check the three dimensional alignment of the system. The projector is optimized when the projection screen is angled to direct light to the patient's head. Place a mirror on the screen. The light should project where the patient's head would be (see Figure 4, below).
3. Adjust the image positioning on the screen. It may be necessary to adjust the projector and the screen. Secure projector by tightening mounting screw .
4. Determine the proper letter size based on the refracting distance used. Refer to Figure 3, below, and the Letter Sizing Charts at the end of this manual (see Figures 9 & 10, pp. 10 - 11).

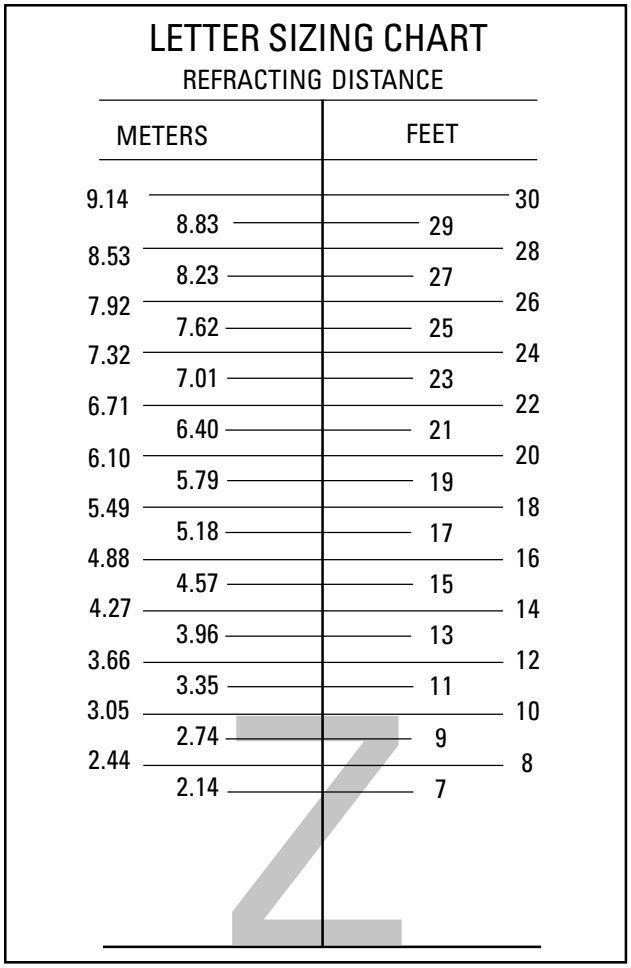


Figure 3 - Reduced-sized version of Letter Sizing Chart (not to scale -- see Letter Sizing Charts on pp. 10-11).

5. Attach Letter Sizing Chart to the screen.
6. Open the unit's projector head cover by lossening the hexagon screw located on the bottom side of the projector head (see Instrument Components, p.3, #6).
6. Move the AP250's Chart Focusing Control and Distance Focusing Control (see "Instrument Components, p. 3, #13 & #14) until the 20/200 or .01 "Z" is in sharp focus and fills the bracket on the Letter Sizing Chart, as shown in Figure 3.

CAUTION: Properly setting focusing and distance controls requires that the projector head cover be opened while the unit is plugged in and turned on. Utilize only the Chart Focus Control and the Distance Focusing Control (p. 3, # 13 & #14) to obtain the proper focus. Do not touch any of the other internal components while setting the focusing and distance controls.

Note: To obtain longer refracting distances in small rooms, a mirror or system of mirrors can be used. A high quality front surface mirror is required. See Figure 5, below, as an example of arrangement of a short room with full 20 foot refracting distance.

To prevent interference with the operation of the Remote Control window, care should be taken not to position any bright lights directly toward the front of the AP250.

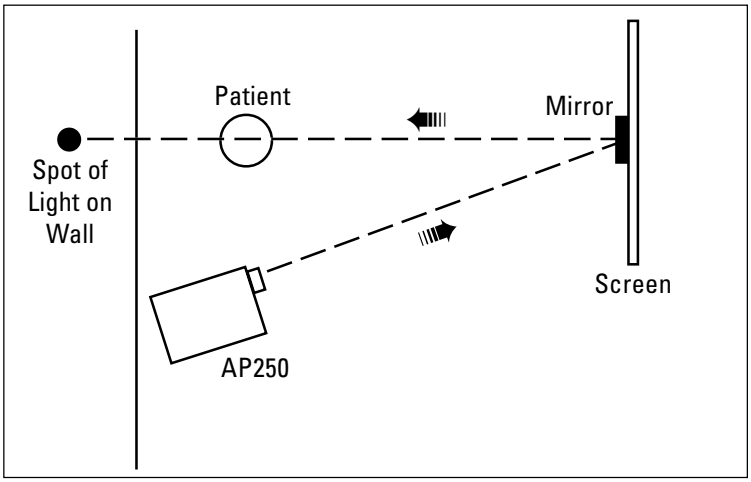


Figure 4 - Checking three dimensional alignment.

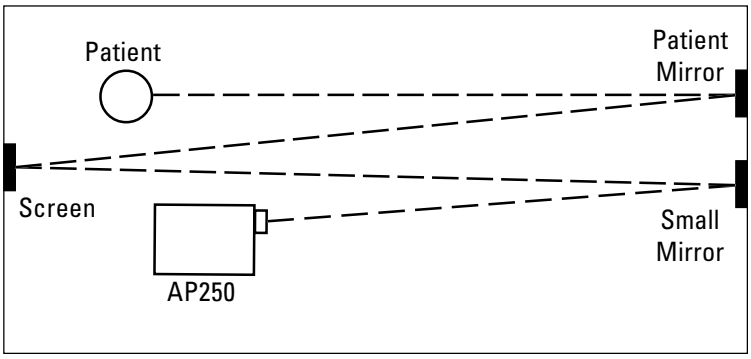


Figure 5 - Using a mirror system in a small room.

Instructions for Use - Remote Control

The AP250 is operated by a sophisticated remote control that is divided into various sections for ease of use (see Figure 6, below).

CHANGING THE EMISSION CODE

The codes of the projector and remote control are factory set to 0000. It is advisable to change the emission code of the Remote Control unit if several projectors are used in the same room, thus avoiding any interaction.

To change the code, follow the steps below:

1. Open the battery compartment on the rear side of the remote control (see Figure 7, p. 7). Select a new combination of switch settings by moving the switches (with a small pointed object). Sixteen combinations are possible.
2. Turn the projector off. Position the Remote Control at least 5 ft. (1.5 m) away from the AP250's Window for Remote Detection. Press the IN Program Key while simultaneously switching on the projector.

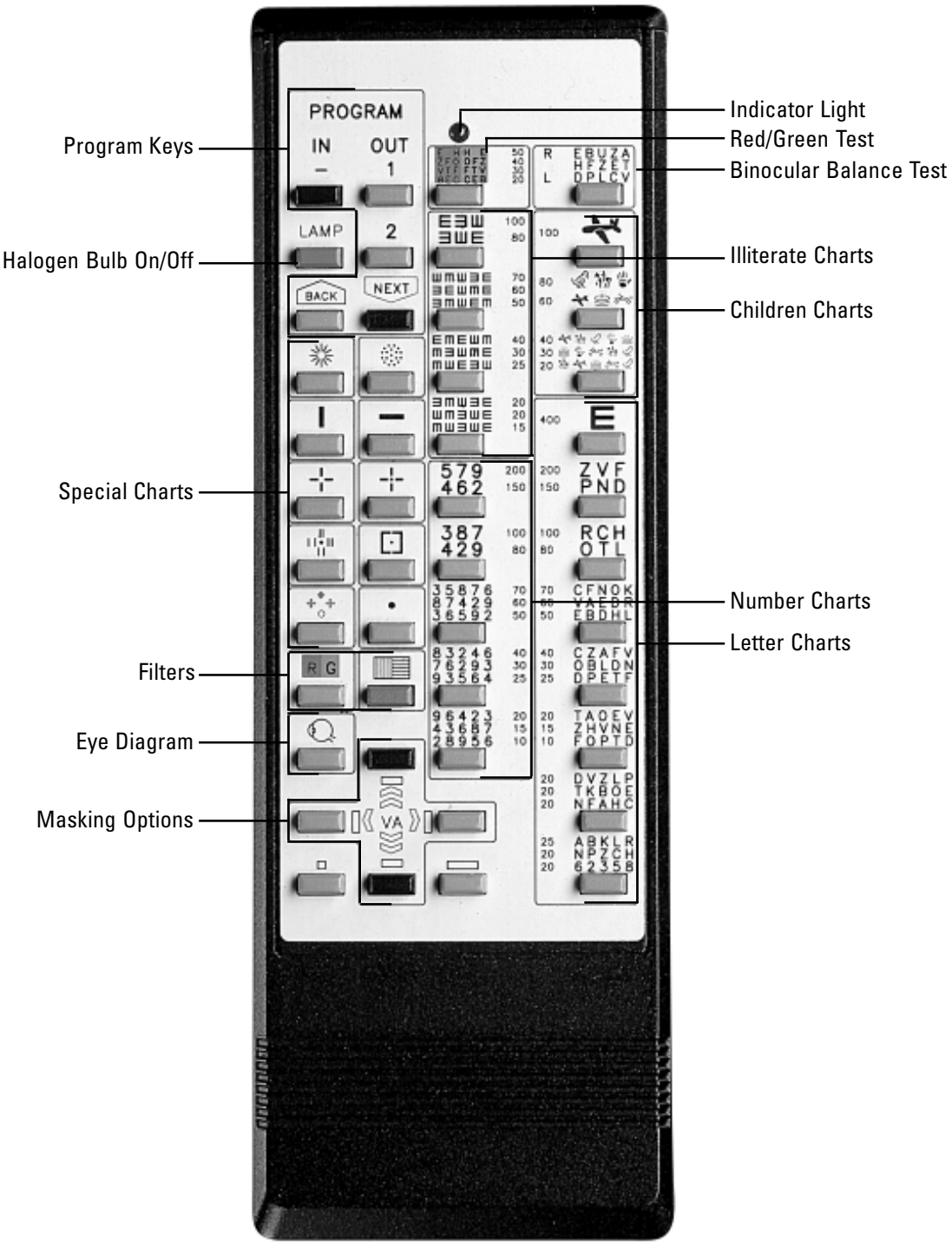


Figure 6 - Remote Control Unit

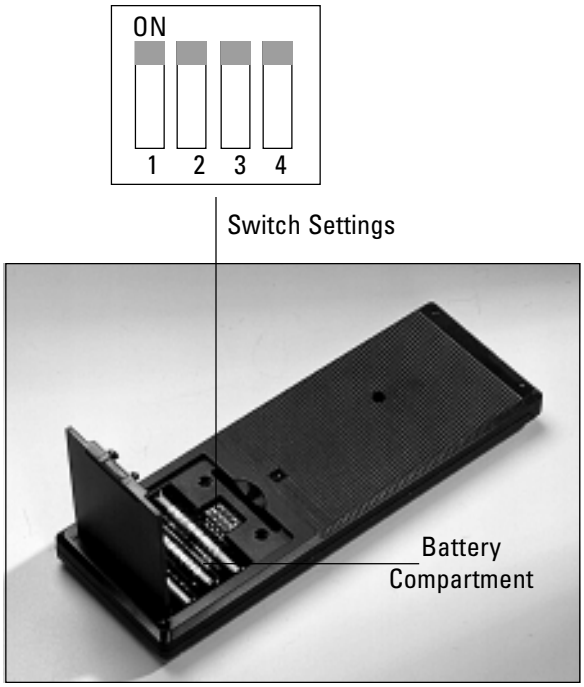


Figure 7 - Changing the Remote Control's Switch Settings

3. The AP250 will start with a short beep. Continue to press the IN Program Key until you hear a longer beep. The code setting is now complete. Release the IN Program Key and continue operation of the AP250.

   NOTE: The red indicator light flashes when pressing any remote control function, indicating that a signal is being sent and batteries are charged.

PROGRAMMING

The AP250 can record up to two (2) slide sequence programs, including masks. Follow the steps below to store, edit and interrupt a programed slide sequence.

Storing a Slide Sequence

1. Press Program Key 1 or 2.
2. Press the IN Program Key.
3. Press the first slide of the desired slide sequence.
4. Confirm the slide selection by pressing the NEXT Program Key.
5. Press the subsequent slides of the sequence, confirming each slide by pressing the NEXT Program Key.
6. After pressing the final slide of the sequence, press the OUT Program Key. The slide sequence is now stored in the selected order as program 1 or 2.

Editing a Stored Slide Sequence

1. Press the Program Key (1 or 2) you want to edit.
2. Press the NEXT Program Key until the slide to be changed appears on the screen.
3. Press the IN Program Key.
4. Press the new slide.
5. Confirm the new slide selection by pressing the NEXT Program Key.
6. Press the OUT Program Key. The new slide sequence is now stored.

Interrupting a Slide Sequence at a Defined Point

1. Press the Program Key (1 or 2) you want to interrupt.
2. Press the IN Program Key.
3. Press the NEXT Program Key until the slide appears that you want to conclude the sequence.
4. Press the OUT Program Key. The new slide sequence is now stored.

Using the Program Sequence

1. Press the Program Key (1 or 2).
2. Press NEXT or BACK to display the slide selections within your programmed slide sequence.

MASKING OPTIONS

The AP250's masking options allow the operator to isolate horizontal lines, vertical lines and individual charts. See Figure 8 below for functions of masking buttons.

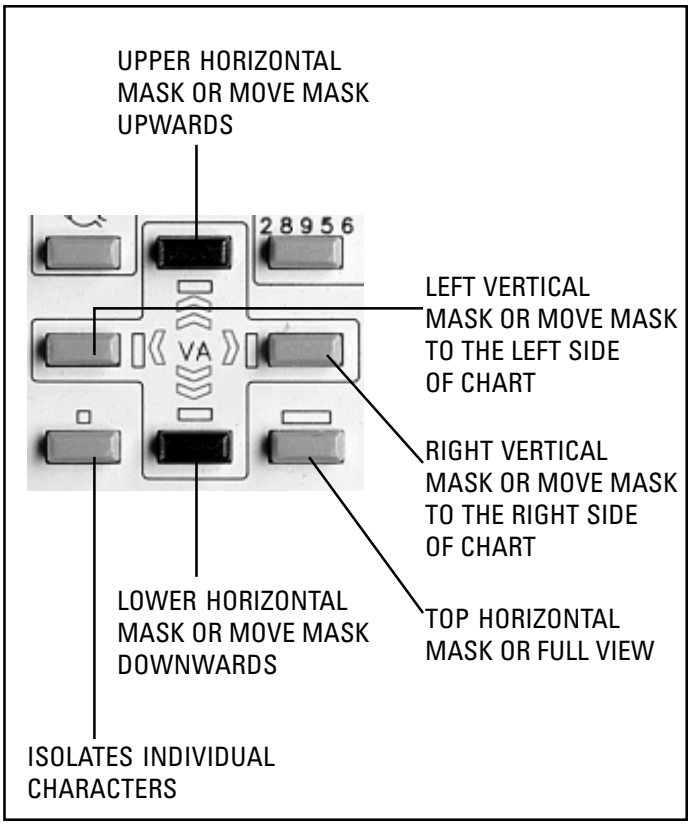


Figure 8 - Functions of masking buttons.

Care and Maintenance

WARNING: Risk of electric shock. Always disconnect the power cord from the wall and the instrument before performing any of the following care and maintenance procedures.

CHANGING THE HALOGEN BULB

WARNING: Do not touch the Halogen Bulb if the unit has been in use. To remove the Halogen Bulb, use a thick cloth or wait until it has cooled.

1. Open the top portion of the projector housing by loosening the hexagon screw located underneath the front portion of the AP250 head (see "Instrument Components, p. 3, #6). Simultaneously grasp the Halogen Bulb Fastening Knob and the copper plate located beneath it. (see Figure 8, below). Slightly turn the knob counterclockwise, being careful not to allow the copper plate or knob to disengage. Continue turning slowly until both the knob and copper plate are loose enough to fall into your hand.
2. Remove the Halogen Bulb by lightly pulling upwards on the Halogen Bulb Connection and then replace the Bulb.

CAUTION: Do not touch the Halogen Bulb as fingerprints on the glass will shorten the Bulb's life.

3. Make sure the Bulb is correctly seated in the holder and tighten the Halogen Bulb Fastening Knob.
4. Shut the top portion of the projector housing; reconnect the power cord and turn the projector on.

   NOTE: If illumination is not uniform, call your Leica dealer or our Customer Service department.

CHANGING THE REMOTE CONTROL'S BATTERIES

1. Open the battery compartment on the rear side of the remote control (see Figure 7, p. 7).
2. Remove four batteries.
3. Insert four new AAA batteries and close battery compartment.

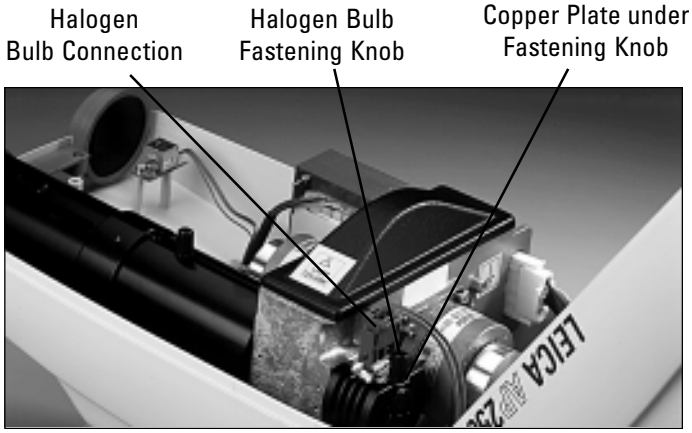


Figure 8 - Replacing the Halogen Bulb.

CAUTION: Observe polarization markings on the inside of the battery compartment and insert batteries accordingly.

CHANGING FUSES

WARNING: Risk of electric shock. Always disconnect the power before changing fuses.

CAUTION: Make sure the rating of the inserted fuses complies with the power requirements listed under Technical Specifications on p. 9.

1. Pull out the fuse compartment located on the backside of the AP250 (see "Instrument Components, p. 3, #10).
2. Replace burnt fuses.
3. Insert the fuse holder into the fuse compartment until it snaps in.
4. Reconnect the power cord and turn the projector on.

CHANGING THE VOLTAGE

WARNING: Risk of electric shock. Always disconnect the power before changing fuses.

CAUTION: Make sure the rating of the inserted fuses complies with the power requirements listed under Technical Specifications on p. 9

1. Pull out the fuse compartment located on the backside of the AP250 (see "Instrument Components, p. 3, #10).
2. Remove fuses.
3. Pull out white voltage indicator and rotate it so the indicator line matches the desired line voltage.
4. Insert appropriate fuses (see p. 9, Technical Specifications, Power Requirements).

ROUTINE CARE

The AP250 requires very little care. The exterior housing is made from polycarbonate and can be cleaned with a mild soap or detergent applied to a clean cloth.

The projector lens and window for remote detection can be cleaned with a soft clean dry cloth.

To clean the remote control, wipe with a soft clean dry cloth.

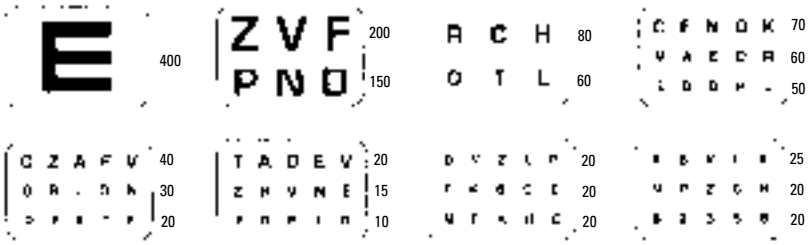
Do not disassemble to clean lenses.

SCREEN CLEANING

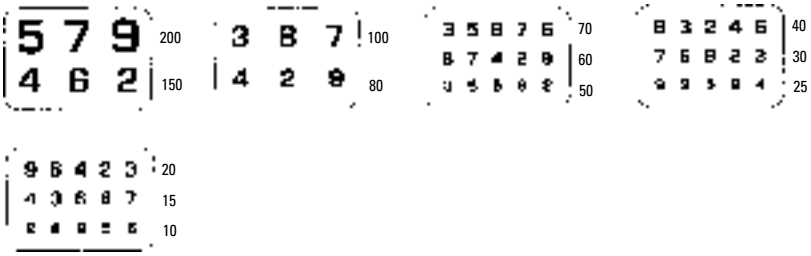
CAUTION: The screen that came with your AP250 has an extremely high reflective characteristic. It is very susceptible to abrasive scratches and finger prints. Handle with care.

Leica AP250 Automated Projector Slide Library

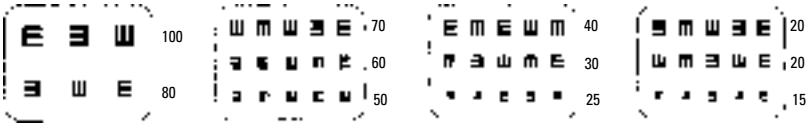
Letter Charts



Number Charts



Illiterate Charts



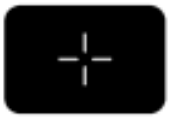
Children Charts

Special Charts

Astigmatism

Red-Green

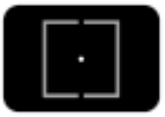
Cross Cylinder


Phoria

Phoria with fixation

Minute Stereo

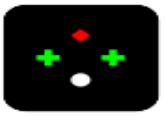
Fixation point


Vertical Coincidence

Binocular Balance

Vertical Line

Horizontal Line


Worth

Eye Schematic

Technical Specifications

Projection distance	10 ft. (3 m) to 26.5 ft. (8 m)
Refraction distance	Min. 7.4 ft. (2.3m) Max. 30 ft. (9.2m)
Number of test charts	33 standard test charts
Masks	Red/green, polarization, single horizontal lines, single vertical, single letters and single numbers
Tilt range of projector	± 15^0
Automatic switch-off	after 30 min. without operation
Power requirements	
Line voltage	110V; 230V; margin ±10%
Line frequency	50 to 60 Hz
Line fuse on 110V	500 mA, slow blow/110V
on 230V	250 mA, slow blow/230V
Projection lamp	12V/30W Halogen bulb
Grounding wire	Instrument to be connected only to proper outlets with correct ground wire
Protection class	1
Degree of protection	IP 21
Power consumption	40 VA
Dimensions (Head Only)	
Height	7"
Width	8"
Depth	13"
Color	White with gray accents
Weight	12 lbs. (5.8 Kg)

LETTER SIZING CHART

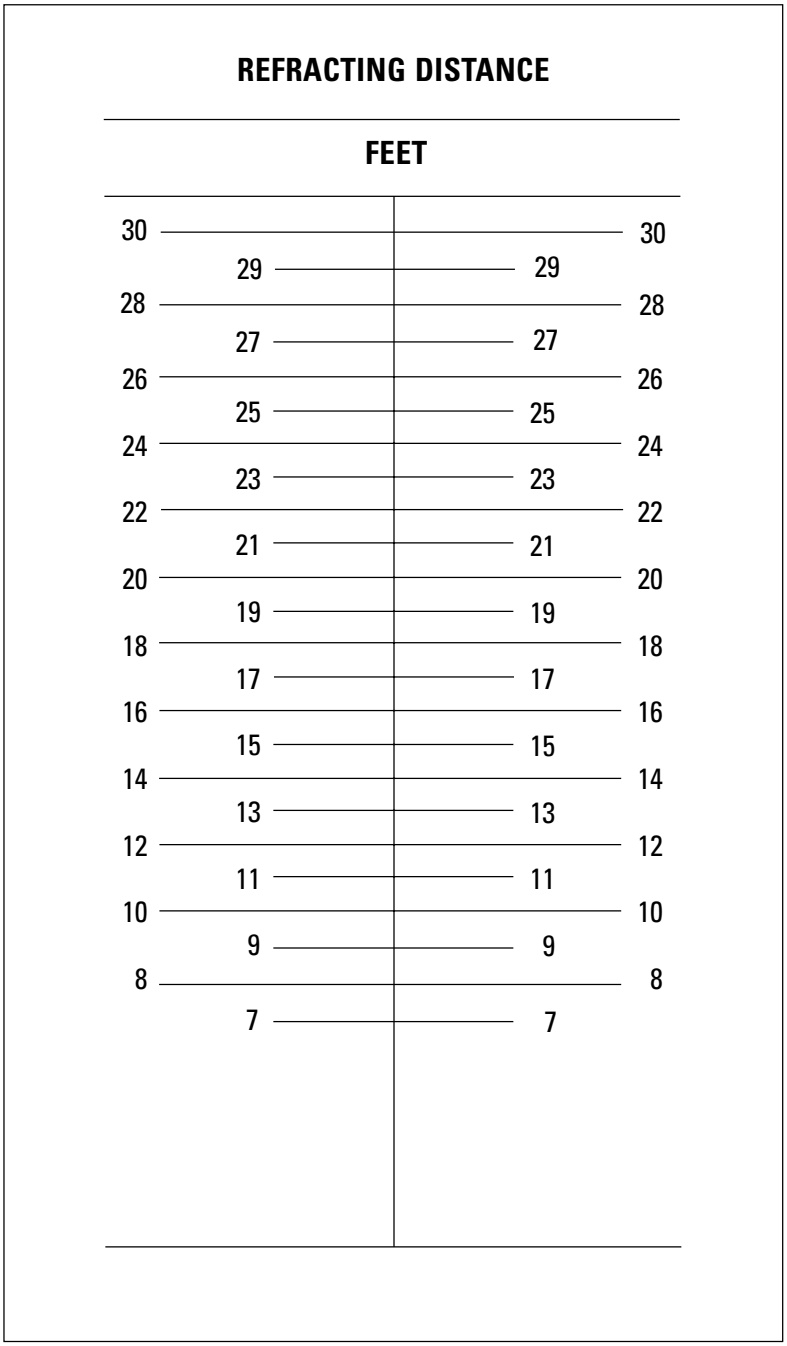


Figure 9 - Letter Sizing Chart in feet

LETTER SIZING CHART

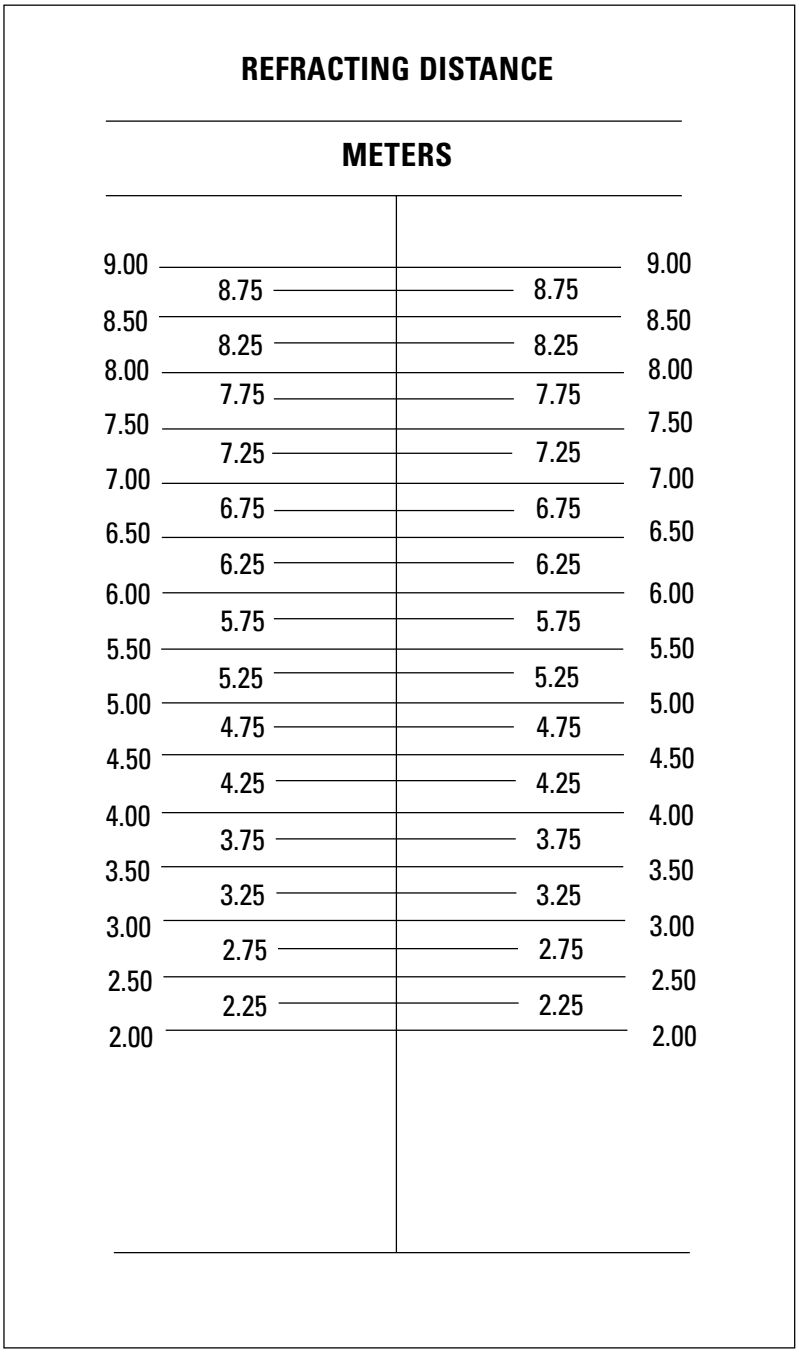


Figure 10 - Letter Sizing Chart in meters

Warranty

This product is warranted by Reichert Ophthalmic Instruments, A Division of Leica Microsystems Inc., against defective material and workmanship under normal use for a period of one year from the date of invoice to the original purchaser. (An authorized dealer shall not be considered an original purchaser.) Under this warranty, Reichert's sole obligation is to repair or replace the defective part or product at Reichert's discretion.

This warranty applies to new products and does not apply to a product which has been tampered with, altered in any way, misused, damaged by accident or negligence, or which has the serial number removed, altered or effaced. Nor shall this warranty be extended to a product installed or operated in a manner not in accordance with the applicable Leica instruction manual, nor to a product which has been sold, serviced, installed or repaired other than by a Reichert factory, Technical Service Center, or authorized Reichert Ophthalmic Instrument Division Dealer.

Lamps, bulbs, charts, cards and other consumable items are not covered by this warranty.

All claims under this warranty must be in writing directed to the Reichert factory, Technical Service Center, or authorized instrument dealer making the original sale and must be accompanied by a copy of the purchaser's invoice.

This warranty is in lieu of all other warranties implied or expressed. All implied warranties of merchantability or fitness for a particular use are hereby disclaimed. No representative or other person is authorized to make any other obligations for Reichert. Reichert shall not be liable for any special, incidental, or consequent damages for any negligence, breach of warranty, strict liability or any other damages resulting from or relating to design, manufacture, sale, use or handling of the product.

PATENT WARRANTY

If notified promptly in writing of any action brought against the purchaser based on a claim that the instrument infringes a U.S. Patent, Reichert will defend such action at its expense and will pay costs and damages awarded in any such action, provided that Reichert shall have sole control of the defense of any such action with information and assistance (at Reichert's expense) for such defense, and of all negotiation for the settlement and compromise thereof.

PRODUCT CHANGES

Reichert reserves the right to make changes in design or to make additions to or improvements in its products without obligation to add such to products previously manufactured.

CLAIMS FOR SHORTAGES

We use extreme care in selection, checking, rechecking and packing to eliminate the possibility of error. If any shipping errors are discovered:

1. Carefully go through the packing materials to be sure nothing was inadvertently overlooked when the unit was unpacked.
2. Call the dealer you purchased the product from and report the shortage. The materials are packed at the factory and none should be missing if the box has never been opened.
3. Claims should be filed within 30 days.

CLAIMS FOR DAMAGES IN TRANSIT

Our shipping responsibility ceases with the safe delivery in good condition to the transportation company. Claims for loss or damage in transit should be made promptly and directly to the transportation company.

If, upon delivery, the outside of the packing case shows evidence of rough handling or damage, the transportation company's agent should be requested to make a "Received in Bad Order" notation on the delivery receipt. If within 48 hours of delivery, concealed damage is noted upon unpacking the shipment and no exterior evidence of rough handling is apparent, the transportation company should be requested to make out a "Bad Order" report. This procedure is necessary in order for the dealer to maintain the right of recovery from the carrier.